ORIGINAL

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Revision of Part 15 of the Commission's	)	ET Docket No. 98-153
Rules Regarding Ultra-Wideband	)	
Transmission Systems	)	

To: The Commission

REPLY COMMENTS OF THE U.S. GPS INDUSTRY COUNCIL, AMERICAN AIRLINES, THE GENERAL AVIATION MANUFACTURERS ASSOCIATION, STANFORD UNIVERSITY (THE GPS RESEARCH PROGRAM) AND UNITED AIRLINES

The U.S. GPS Industry Council ("the Council"),[1] American Airlines,[2] the General Aviation Manufacturers Association,[3] Stanford University (the GPS Research Program),[4] and

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1 The Council is a non-profit 501(c)(6) industry trade association whose mission is to be an information resource to the Government, the media, and the public on GPS. The Council's purpose is to promote sound policies for the development of commercial markets in civilian applications, while preserving the military advantages of GPS. Current membership includes the principal U.S. manufacturers of GPS equipment — e.g., Boeing, Honeywell, Magellan/Ashtech, Rockwell International, and Trimble Navigation. The Council represents a significant sampling of the manufacturers of GPS equipment and the millions of users of GPS signals. Many of the numerous Council's members are engaged in activities with safety-of-life implications.

2 American Airlines is one of the foremost U.S. air carriers, operating a fleet of 659 aircraft. American occupies a leadership role in the application and use of aviation communications and other technology and our presence will continue to expand on into the 21st century.

3 GAMA is a national trade association representing 54 manufacturers of fixed-wing aircraft, engines, avionics and components. In addition to building all the general aviation aircraft flying in the United States today, GAMA member companies also operate aircraft fleets, airport fixed-base operations, pilot schools and training facilities across the country. General Aviation is a $15 billion industry which generates more than $45 billion annually in overall economic activity. General Aviation exports one-third of its production and leads the world in development of new technology aircraft.

4 Stanford University has been active in research in satellite navigation and GPS since 1989. At present, GPS research is conducted by four faculty, four professional researchers, and twenty-five Ph.D. students. The research covers GPS augmentation for aviation using wide-area differential GPS and local area differential GPS, elements which are instrumental to public safety in aviation. The research also covers GPS augmentation for agriculture and precision construction, again both of which have significant public safety responsibilities.

United Airlines[5] (collectively referred to herein as "GPS Commenters"), by counsel and pursuant to Sections 1.415, 1.419, and 1.430 of the Commission's Rules,[6] hereby submit these Reply Comments in the above-referenced docket proceeding, which seeks to investigate the possibility of permitting the operation of ultra-wideband ("UWB") radio systems on an unlicensed basis under Part 15 of the Commission's rules.[7] The Council emphasized in its Comments, and the GPS Commenters reiterate here, that the Commission must protect operations in the restricted bands, including the safety-of-life applications of the Global Positioning System ("GPS") in the 1559-1610 MHz band, from harmful interference resulting from any UWB radio emissions.[8]

The GPS Commenters emphasize that the Commission cannot afford to engage in a "traditional" weighing of the impact of unwanted interference from UWB operations into the GPS bands (which are "restricted" bands as the Council noted in its initial comments), given the need to protect GPS as it is used in myriad public safety applications. The need to protect GPS is, and must remain, the Commission's paramount objective. If GPS either is not protected or if there is a question about whether sufficient protection is being provided, any further consideration of UWB for a particular band would have to be rejected.

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5 United Airlines is the largest airline in the world, securing 1997 revenue in excess of $17.4 billion with the a diverse fleet of 582 aircraft. Since 1926, United Airline's pioneering efforts have helped to expand commercial aviation and refine global airline service. Today, after 70 years of passenger and cargo service, United Airlines spans 139 destinations in 30 countries and two territories on five continents. United's presence continues to expand into the 21st century, as its key STAR Alliance embraces Ansett and Air New Zealand into the worldwide reach of Air Canada, Lufthansa, Varig, and Thai Airways.

6 47 C.F.R.§§ 1.415, 1.419, and 1.430.

7 *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems,* FCC 98-208, slip op. at 1 (¶1) (released September 1, 1998).

8 *See* Comments of The U.S. GPS Industry Council, ET Docket No. 98-153, at 1, 5 (filed December 7, 1998) ("Comments").

I. INTRODUCTION

In its Comments, the Council stressed that UWB radio systems, if ultimately to be permitted, should be limited to bands well above 1610 MHz — to ensure that UWB operations do not place any harmful out-of-band or spurious emissions into the GPS bands.[9] Such a limitation is essential to protect GPS users from receiving harmful interference from UWB operations. In their comments, a number of responsible UWB proponents and supporters recognized that UWB systems had the potential to produce harmful interference into the GPS and other restricted bands, and urged the Commission to protect the users in these bands in the event the Commission initiates a rulemaking proceeding to consider the authorization of UWB systems. As explained below, the GPS Commenters endorse these views, and urge the Commission to disregard as flawed those commenters which ignore or dispute this conclusion.

II. DISCUSSION

A. UWB Proponents Have Recognized The Harmful Effect Of UWB Emissions In The GPS Bands.

Certain proponents of UWB radio systems have expressed concern for the integrity of the GPS and other restricted bands if UWB systems were to operate in those bands.[10] The GPS Commenters stress that these commenters (i) are independent with respect to GPS; (ii) have invested in the development of UWB systems; (iii) would benefit if the Commission eventually authorizes the operation of unlicensed UWB radio systems; (iv) have substantial experience with UWB technology; and (v) understand the impact of UWB transmissions on the frequency spectrum.[11] These factors significantly enhance the credibility of these commenters' assertions

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9 *See id.* at 5-6.

10 *See* Comments of Multispectral Solutions, Inc., ET Docket 98-153, at 10 (filed December 7, 1998) ("Multispectral Comments"); Comments of TEM Innovations, Response to FCC 98-208 Notice of Inquiry, at 7 (filed December 4, 1998) ("TEM Comments"). *See also* Comments of Arthur D. Little, Inc., ET Docket 98-153, at 8 (filed December 1998) ("A. D. Little Comments") (recognizing that UWB emissions could degrade performance in bands where services require a low positive signal to thermal noise ratio).

11 *See generally* Multispectral Comments; A. D. Little Comments; and TEM Comments.

regarding harmful interference from UWB operations into the restricted bands, and provide support for the Council's Comments on the criticality of protecting the GPS frequency bands.

Given this, if the Commission initiates any further proceeding with respect to the authorization of UWB systems, it must do so consistent with the views of those responsible and credible UWB proponents who have recognized the harmful effect of UWB emissions in the GPS bands and other restricted bands.

B. The Commission Should Heed The Views Of Those UWB Proponents That Seek The Prohibition Of UWB Operations In The GPS Bands And Other Restricted Bands.

Not only have certain UWB proponents responsibly recognized that UWB emissions would cause harmful interference to operations in the restricted bands, one of the commenters has also conducted tests that confirmed the failure of GPS receivers to acquire the satellite signal in the presence of a UWB signal.[12] Similar tests have also confirmed the increase in the noise floor when an UWB emitter was placed at 411 and 534 meters from L-band and S-band radars, respectively. These tests did not even include any aggregate effect of UWB systems, which would have increased the level of interference.[13] Accordingly, some proponents of UWB radio systems have advocated that the Commission should prohibit the operation of UWB radio systems within the restricted bands.[14] The GPS Commenters agree with this assessment, and believe that the prohibition should extend to out-of-band emissions from UWB systems (at least for the GPS bands).

By the nature of their design, GPS systems are susceptible to in-band interference, as well as to spurious and out-of-band interfering emissions.[15] The GPS Commenters agree with the view expressed by the Consumer Electronics Manufacturers Association and the National

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12 *See* TEM Comments at 8.

13 *See id.*

14 *See* Multispectral Comments at 8; TEM Comments at 7.

15 *See* Comments at 4.

Association of Broadcasters that it would be inconsistent for the Commission to amend its rules to allow UWB systems, given its knowledge that such systems would cause harmful interference, inter alia, in the restricted bands.[16] The Commission must reject any proposal that would result in uncertainty in the integrity of the GPS bands and the reliability of GPS to the millions of GPS users worldwide.[17]

C. Any Increase In Background Noise In The GPS Frequency Bands Is Intolerable.

Any increase in background noise in the GPS frequencies is of concern, as GPS is susceptible to such interfering emissions. Increases in background noise in the GPS frequency bands may reduce the ability of the GPS receiver to acquire a GPS signal or even to maintain tracking of a GPS signal, or cause errors in position or time accuracy.[18] **Any of these consequences is intolerable for a safety-of-life service such as GPS.**

There is no question that UWB operations would increase the background noise in a given spectrum. In fact, even commenters who have disregarded harmful interference to operations in the GPS bands from UWB transmissions have nevertheless recognized that UWB emissions would appear as unintentional radiators — and thus increase the background noise.[19] The Commission must always take into account the susceptibility of GPS users to interference in the GPS spectrum, no matter what proposal the Commission is considering or how "minimal" the additional interference would be.

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16 *See* Comments of the Consumer Electronics Manufacturers Association and the National Association of Broadcasters, ET Docket 98-153, at 2 (filed December 7, 1998).

17 The GPS Commenters thus strongly oppose the proposal from Interval Research Corporation ("Interval") advocating that the FCC should refrain from specifying a frequency range for UWB radio systems. *See* Comments of Interval Research Corporation, ET Docket 98-153, at 7 (filed December 7, 1998) ("Interval Comments").

18 *See* Comments at 4-5.

19 *See* Comments of the Ultra-Wideband Working Group ("UWBWG"), ET Docket No. 98-153, at 11 (filed December 7, 1998) ("UWBWG Comments"); Interval Comments at 12.

In this last regard, the GPS Commenters take issue with the statement of the Ultra-Wideband Working Group that the Commission's regulations should be designed to "minimize the likelihood of harmful interference" in the restricted bands.[20] "Minimizing" interference is the wrong objective. Any additional interference, intentional or unintentional, constant or intermittent, in the GPS bands is a problem that must be strictly prohibited.

III. CONCLUSION

Millions of users worldwide rely on the stability, continuous availability, and integrity of the GPS service that is provided by the U.S. Government and confirmed in the U.S. Presidential Decision Directive and various statutes. The Commission must be vigilant in ensuring that no additional interference is introduced into the GPS bands, and must ensure the protection of the GPS user base by refusing to establish or authorize any service or operation that would jeopardize the operation of GPS receivers and applications and that would be counter to existing public law requiring the prevention of disruption and interference to GPS. The burden of proof here must be on the proponents of new services to show that they do not create harmful interference in the GPS bands, and no such showing has been forthcoming from UWB proponents.

The GPS Commenters urges the Commission to consider carefully the issues they have raised both in the Council's Comments and in these Reply Comments as it investigates the possibility of proposing a revision of its rules to authorize unlicensed UWB radio systems under Part 15. If the Commission initiates a rulemaking proceeding on the UWB concept, it must act consistently with the views of responsible and credible UWB proponents that have recognized the

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[20] *See* UWBWG Comments at 10-11.

harmful effect of UWB emissions in the GPS bands and carve out the GPS bands altogether from the proposal. The Commission must also reject any proposal that would increase the noise floor in the GPS frequency bands.

Respectfully submitted,

U.S. GPS INDUSTRY COUNCIL
AMERICAN AIRLINES
THE GENERAL AVIATION MANUFACTURERS ASSOCIATION
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